FINAL REPORT
NAGW-1854

OCEAN COLOR STUDIES OF THE EASTERN ATLANTIC ALONG THE 20 DEGREE WEST MERIDIAN

1 December, 1988 to 31 May, 1990

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INTRODUCTION

This grant (NAGW-1500) was originally awarded to me as a three-year grant when I was at the Skidaway Institute of Oceanography, Savannah, Georgia. I left Skidaway in July, 1989, to accept a position at the Graduate School of Oceanography, University of Rhode Island. Funds covering the final 4 months of the first year of the grant were transferred to URI as NAGW-1854. When I submitted the second-year renewal of NAGW-1854, NASA Headquarters inadvertently issued a new grant number (NAGW-1891) for the continuation funding. Funding for my research projects initiated under NAGW-1854 continues today as NAGW-1891.

SUMMARY OF PROGRESS

A. Equipment and Software

During this 1-year grant, I helped Dr. Charles McClain, NASA/Goddard Space Flight Center develop an ocean color processing/analysis software package (PC-Seapak) to run on PC/AT class computers. My role was to test subroutine components of the package and report problems to the programmer with suggestions for improvements. The package is now operational and I continue to make suggestions for improvements and enhancements to PC-Seapak, as well as help test new routines. The package is menu-driven and very user-friendly. It is particularly useful for students and others who are learning how to process CZCS/AVHRR imagery.

We installed the global CZCS archive at Graduate School of Oceanography, URI. The archive was distributed on Sony 12-inch optical platters which are maintained in our collection of optical disks. Upon request, we mount the optical platters on our Sony Jukebox and the data is then on-line and accessible to our Vax- and PC-based image processing software.

B. JGOFS 1989 Spring Bloom Study

During spring, 1989, I spent 7 weeks in the field as a member of the scientific party supporting the Airborne Oceanographic Lidar (AOL) deployed on the NASA P-3. The AOL flew in support of the JGOFS spring bloom study. The JGOFS study included investigators from the U.S., Canada, U.K., Germany and Holland deployed on 4 ships in the North Atlantic. My role was to coordinate P-3 missions with the ship-based studies.

The AOL measured phytoplankton chlorophyll and phycoerythrin fluorescence. In addition, aircraft sensors made passive ocean color measurements (32 channels in the 400-750 nm range), infrared measurements for sea surface temperature and dropped AXBTs to

measure subsurface temperature structure. Table 1 shows the timing and location of P-3 missions.

The P-3/AOL results are used to determine phytoplankton variability at the JGOFS study sites. Frank Hoge and co-workers will use the AOL results for ocean color algorithm studies. I am coordinating the distribution of AOL data to other JGOFS PIs and am be actively involved in merging AOL with in situ measurements.

Table 1. P-3/AOL missions during JGOFS 1989.

Date	Mission	Ship/Mooring Overflown
4-20	Wallops to St. Johns Canada	Baffin (Canada)
4-21	St. Johns to Azores	
4-25	34°N Station	Meteor (Germany)
4-26	Azores to Shannon, Ireland	Atlantis (U.S.), U.S. and U.K. Moorings
5-2	47°N Station	Atlantis (U.S.) U.S. and U.K. Moorings
5-10	47°N Station	Discovery (U.K.) Meteor (Germany) U.S. and U.K. Moorings
5-13	47°N Station	AXBT map of study area
5-18	47°N Station	Atlantis Discovery Meteor U.S. Mooring
5-21	Shannon to Keflavik, Iceland	Discovery U.S. Mooring
5-24	60°N Station	U.S. Mooring
5-29	60°N Station	Discovery Meteor U.S. Mooring
6-3	60°N Station	Discovery U.S. Mooring
6-4	Return to U.S., no data en route	

C. Meetings and Presentations

In addition to the field project described in section 2, I attended the following meetings and made the following presentations using funds from this grant.

1. J.A. Yoder. JECSS V., Kangnung, Korea, September, 1989 (invited talk). Comparison of Coastal Zone Color Scanner (CZCS) Imagery of Western Boundary Current Fronts in the East China Sea and Off Southeastern U.S.

2. J.A. Yoder, F.E. Hoge and R.N. Swift. Ocean Sciences Meeting (AGU/ASLO), New Orleans, February, 1990. Spatial Variability of Surface Temperature and Phytoplankton Pigment During the JGOFS Spring Bloom Study as Measured by the Airborne Oceanographic Lidar (AOL).

3. A.R. Robinson, D.J. McGillicuddy, J. Calman, F.E. Hoge and J.A. Yoder. Ocean Sciences Meeting (AGU/ASLO), New Orleans, February, 1990. Mesoscale eddies in the 1989 JGOFS Bloom Study Region as Observed Using Geosat Altimetric and in situ Data.

4. J. A. Yoder. U.S./Japan Symposium on Satellite Ocean Color, February, 1990, Tokai University, Tokyo, Japan (invited talk). Ocean color observations and the Joint Global Ocean Flux Study.

D. Manuscripts.

Results obtained during the period of this grant led to the following two manuscripts which are both "in press." Reprints will be provided once they are available.

1. Yoder, J.A., J. Aiken, R.N. Swift, F.E. Hoge and P.M. Stegmann. 1992. Spatial variability in near-surface chlorophyll a fluorescence measured by the Airborne Oceanographic Lidar (AOL). Deep-Sea Research, in press.

2. Robinson, A.R., D.J. McGillicuddy, J. Calman, H.W. Ducklow, M.J.R. Fasham, F.E. Hoge, W.G. Leslie, J.J. McCarthy, S. Podewski, D.L. Porter, G. Saure and J.A. Yoder. 1992. Mesoscale and upper ocean variabilities during the 1989 JGOFS bloom study. Deep-Sea Research, in press.

E. Graduate Student Theses.

Two Ph.D. theses were initiated with funds from this grant.

1. C.W. Brown. Spatial and temporal distribution of coccolithophorid blooms i the northwestern Atlantic Ocean and their biogeochemical consequence. Expected completion: January, 1993.

2. G. Garcia-Moliner. Phytoplankton dynamics in the Mid-Atlantic Bight as determined from CZCS (ocean color) satellite imagery (1978-1986). Expected completion: May, 1993.